

The effect of a game-based mini tennis training model on improving the skills of groundstroke forehand drive tennis

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Abstract:

This study aimed to determine the effect of a game-based mini tennis training model on improving groundstroke forehand drive skills in court tennis, focusing on the ages of 6–8 years. The research conducted a quantitative method with a quasi-experiment with a pre-test and post-test non-equivalent to control the group design. The response of this study was 44 West Sumatra tennis athletes at 6–8 years old. They were divided into two groups, where 22 response were in the experimental group. Meanwhile, the 22 subjects were in the control group. The data and instruments for groundstroke forehand were driven to get children's tennis test score ratings. The data were analysed with SPSS 24 application. The results of this study showed that the $t = 5.649, df = 42$, and the significance (2 tailed) or $p - value = 0.000 < 0.05$. Besides, the hypothesis was tested to reject the driving force for the forehand drive field in the experimental group using the game-based mini tennis model, which was higher than in the control group. Thus, the results of the descriptive statistics with 22 experimental subjects showed a mean of 18.05, and after they were given the treatment, the post-test results showed a mean of 24.95. This shows that descriptively differences were obtained before and after treatment. Thus, the result of the descriptive statistics for the 22 control subjects was a mean of 18.09, and after treatment, the average post-test result was 22.95. This shows that descriptively differences were obtained before and after treatment. Therefore, it can be confirmed that the game-based mini tennis training model effectively improved forehand technique skills for West Sumatra tennis athletes at 6–8 years old.

Key Words: 6–8 year old, West Sumatera athletes

Introduction

The successful development in a country cannot be separated from the quality of its human resources. To educate the nation's people, the Indonesian government is carrying out developments in various fields, one of which is in the field of sports. Indonesia is one of the countries that has good sports achievements. The sporting achievements are on the tennis court. This good achievement can be maintained by the presence of regeneration for the recruitment and coaching of athletes so that the existing potential can be nurtured over a long period of time and supported by talented athletes. Talented athletes have a greater chance of achieving high performance. The sport of tennis is increasingly popular among the community, be it in children, adults or in the elderly, not just among athletes. Tennis can be conceived as having originally been a relative of medieval football, which was played with similar rules by the clergy in the cloisters of their monasteries (Catmur et al., 2008).

Tennis is a small ball game which can be played singles or doubles. Game applied by hitting the ball using a racket into the opponent's court limited by net (Sitompul, 2020) Tennis is played by a pair of people (one on one) called playing singles, or by four people (two against two), called playing doubles. Tennis requires foot speed, accuracy, stamina, anticipation, and ingenuity or tactics. The Pearson's correlations found all the levels and the ratings of experience. The tennis rating score for children (TRSC) is judged to have proven to be very valid and reliable compared to actual assessments of coaching experts when assessing the technical skills of novice players, and this tool may help make a more objective diagnosis of the technical level of young tennis players for tennis coaches (Šlosar et al., 2019). The maximum achievement occurs once the physical foundation is excellent. The stronger the physical foundation, the greater the potential for developing technical, tactical, and psychological attributes (Bompa & Haff, 2009). Therefore, improving the drive speed while maintaining a significant level of control is one of the factors of performance required for success in tennis. Consequently, strength training has become vital in the modern game because it can increase the ball velocity (Polczyk & Zatoń, 2015). Through all the competition events there are many times where athletes at every level and every exercise, not only to overcome physical fatigue but also to deal with psychological stresses and possibilities unpleasant emotions (Theodosiou et al., 2018). The use of inappropriately sized equipment that leads to qualitative changes in coordination is perhaps most apparent in children's sport, whereby children are often expected to execute skills with equipment that is designed for adult (Buszard et al., 2020). Provide an adequate

diet that helps to control performance limiting factors, facilitating good recovery after training and matches, and helps create better physiological adaptations for tennis players (Sánchez-Oliver et al., 2018).

There are two skills required in tennis, namely the forehand groundstroke and backhand groundstroke. Skill is the ability to produce a result with maximum certainty and minimum expenditure of energy and time. A person's technical skills are developed through exercises that are carried out systematically, planned, and that consider the principles of practice. The principle of training in every sport is very important for athletes because it can support efforts to improve the quality of the training undertaken for achievement. The groundstroke is a stroke taken after the ball touches the field or after it bounces off the field.

The forehand groundstroke is essential in tennis because it is frequently played and significantly influences the game. Within the competitive tennis community, common knowledge points are often won or lost with consistent and robust forehand groundstrokes (Wan et al., 2014). Many young tennis players are undergoing intensive training from an early age. First learning stage concerns the flat stroke, which is quickly being replaced by top-the stroke rotates to allow for increased ball speed and spin, such that the stroke margin of error is maintained (Rogowski et al., 2011) One of the most common stroke techniques used in tennis is the tennis forehand drive, which is widely used in matches and practice. High-performance sports training is a very complex activity and requires considerable effort, according to experts (Rosa et al., 2010). Improving the quality of exercise performance is very complex and requires the efforts of professional experts. The expert referred to here is a sports coach. Trainers have the coaching ability to convey information effectively to, maximize training time, have good quality athletes, and provide the in-depth analysis (Baker & Horton, 2004). At the beginner and professional levels, the mastery of skills is undoubtedly different. It is due to the ability to visually interpret and identify attack areas and coordinate gross and fine motor skills. Therefore, coaches are advised to do a game-based training model to improve the quality of athletes, especially children or young athletes. The statements of the following experts support this. Physical fitness in childhood is a marker of health as it reflects the functional status of most of the body functions involved in daily physical activity and/or physical exercise. Therefore, measuring and monitoring these health indicators beginning from an early age is of the highest importance (Miežienė et al., 2017). The conditions described in the research literature are related to the game-based mini tennis model. Therefore, it is essential for all training sessions, especially for tennis athletes who are 6–8 years old.

It is very important that a training model contains elements of learning and also emphasizes the element of fun. coaches can analyze less skilled players and skilled players through a learning approach through play activities (Romeas et al., 2016). In addition, their Technical and individual abilities can be improved through various games by the coach. (Gibson Moreira Praça, Filipe Manuel Clemente, André Gustavo Pereira de Andrade, Juan Carlos Perez Morales, 2017). The principle of learning from games was supported by (Johns, 2006) who stated that “The games approach lets kids discover what to do in the game not by telling them but by their experiencing it”. Meanwhile, according to (Brueggemann, 2008), “The game is the best teacher.” Based on this philosophy, the conditions in the game of tennis can be fulfilled. A very important or crucial condition is that it requires players to be able to do or realize what is needed and how the game requires it. Mini tennis model training is a model approach in learning tennis court for facilitating the achievement of learning outcomes (Made Danu Budhiarta, n.d.).

One of the needs that must be met in training activities and games is an interaction, such as according to the statement of "A game can provide the venue for a range of social interactions to unfold, competition, cooperation, negotiation, etc." (Soute et al., 2010). The game provides a place for various social interactions, such as competition, cooperation, and negotiation. This social interaction can be formed through a variety of exercises that use games, which are in line with the statement (Rosa et al., 2010): "To confirm the value of game-based training for improving skills and also physical fitness in team-sport athletes". Game-based training can improve athletes' skills and fitness. With exercise it is possible to simulate sports movement patterns and in practice activities you can use games (Madić2 & Krističević, 2016), and game sense approach can be used to focus on learning and is the starting point of a game or a game. It therefore provides a context for developing the game. (Pill et al., 2020).

Materials & methods

This study used a quasi-experimental design research method in which there is a control group that is not fully functional to influence the implementation of the experiment. This design was aimed at describing the results of the pre-test and post-test tests in the control group and the experimental group. At this stage of the effectiveness test, forty-four (44) athletes were used as respondents, consisting of twenty-two (22) subjects who were in the experimental group and twenty-two (22) subjects who were in the control group. This study used two groups: the first group was given treatment A (game-based mini tennis) and the second group was given treatment B (conventional exercise). Both groups did a pre-test before being given treatment. Then, the post-test was carried out after treatment.

In this study, we studied tennis athletes 6–8 years of age who practiced at several clubs in West Sumatra, including the Field Tennis Training Club at Padang State University (PTL UNP), Payakumbuh Field Tennis Training Club (PTL Payakumbuh), Field Tennis Training Club H. Agus Salim, Kota Pariaman Tennis

Club (KTC), Semen Padang Tennis Court (PTSP), Tuntang Tennis Club (TTC) and Sawahlunto Tennis Club. The study was carried out over 16 meetings. The total research subjects included 44 people from the two groups. The sampling technique was total sampling. The following is an example of a game that we asked the research subjects to perform



Figure 1. Display of one example of game-based mini tennis

In the first figure, an example is shown of the form of a game-based mini tennis model performed by the individuals. This game can be done to improve tennis skills and to increase the confidence and competence of each athlete.



Figure 2. Display of one example of game-based mini tennis

In the second figure, this is an example of a game-based mini tennis model performed in teams or in pairs. Apart from being able to improve tennis skills, there are other values, such as increasing the value of cooperation, confidence and competition. In the control group, the researcher provided treatment with exercises that were carried out independently in teams and in pairs that had been planned beforehand.

Our next step was to determine the difference between the two groups in the post-test results. The experimental group conducted a game-based mini tennis model. Meanwhile, the control group continued with the previous training model. The instrument test was applied to study the beginner skill level or Tennis Rating Score for Children (TRSC), which is designed to provide objective information about technical progress in one of the three main tennis strokes (forehand, backhand, or service) in tennis players who have a relatively low level of experience with the tennis training process. Evaluation is carried out by assigned a value on a five-point Likert scale after an appropriate revision is made to the execution of the stroke, which was previously noted. Furthermore, to confirm the significance of the difference in the effectiveness of the game-based mini tennis model with the traditional training model, it is necessary to test it statistically through several stages of analysis, namely a data normality test, t-test, and independent-sample t-test.

Results

This The significance and efficiency of the model was tested in both groups using the t-test procedure and the SPSS 24 application. In Table 1, we show the descriptive statistics.

Table 1. Descriptive statistics

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Pretest Eksperimen	22	16	20	18.05	1.253
Postest Eksperimen	22	23	27	24.95	1.133
Pretest Kontrol	22	16	20	18.09	1.306
Postest Kontrol	22	21	25	22.95	1.214
Valid N (listwise)	22				

In Table 1, we show the results of the statistics for the 22 experimental subjects with a mean of 18.05, and after treatment, the post-test results showed a mean of 24.95. This shows that descriptive differences were obtained before and after treatment. The results for the descriptive statistics for the 22 control subjects showed a mean of 18.09, and after treatment, the average post-test result was 22.95. This shows that descriptive differences were obtained before and after treatment. We show a summary of the normality test calculation results in Table 2. As shown in Table 2, the test results are shown in the Kolmogorov–Smirnov and Shapiro–Wilk columns.

Table 2. Tests of normality for the experiment group

Tests of Normality

	Postest Eksperimen	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pre Eksperimen	Pretest Eksperimen	.167	22	.111	.921	22	.082
	Postest Eksperimen	.166	22	.119	.927	22	.107
	Pretest Kontrol	.164	22	.127	.914	22	.058
	Postest Kontrol	.169	22	.102	.922	22	.084

a. Lilliefors Significance Correction

Based on the data table of the control group tests for normality, we observed a significance in the Kolmogorov–Smirnov and Shapiro–Wilk columns for all the previous data. Following our test criteria, if the significance was higher than 0.005, then H_0 was accepted; thus, the data was normally distributed. Because the data was normally distributed, it was possible to use parametric statistics (paired sample t-test and independent sample t-test) to perform research data analysis. The paired sample results are shown in Table 3. The paired sample correlation results are shown in Table 4, and the paired sample t-test results are shown in Table 5.

Table 3. Paired sample statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest Eksperimen	18.05	22	1.253	.267
	Postest Eksperimen	24.95	22	1.133	.242
Pair 2	Pretest Kontrol	18.09	22	1.306	.278
	Postest Kontrol	22.95	22	1.214	.259

Table 4. Paired sample correlations

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest Eksperimen & Postest Eksperimen	22	.102	.651
Pair 2	Pretest Kontrol & Postest Kontrol	22	-.057	.800

Table 5. Paired sample t-test

Paired Samples Test

		Mean	Std. Deviation	Paired Differences			t	df	Sig. (2-tailed)
				Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest Eksperimen - Postest Eksperimen	-6.909	1.601	.341	-7.619	-6.199	-20.243	21	.000
Pair 2	Pretest Kontrol - Postest Kontrol	-4.864	1.833	.391	-5.677	-4.051	-12.443	21	.000

Based on the data for the paired sample t-test, for the results of the output pair 1, the significance (2-tailed) value was $0.000 < 0.05$; there was a difference in the average training results for the athletes for the experimental class pre-test and the experimental class post-test. Based on the output pair 2, a significance (2-tailed) value of $0.000 < 0.05$ was obtained, and there were differences in the average training results of athletes for the control / conventional class pre-test and the control class post-test. Thus, based these results, there was a difference in the average training results for the athletes for the experimental class pre-test compared with the

post-test experimental class and for the control class pre-test and the control class post-test. Next, we will discuss the homogeneity test results shown in Table 6.

The homogeneity test aims to determine the diversity of data from two or more groups that are homogeneous / the same. Homogeneous data are required for the independent sample t-test. In addition, the homogeneity test was used to determine the diversity of the post-test data for the experimental class and post-test data for the conventional class, which was either homogeneous or not.

Table 6. Test of homogeneity of variance
Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Forehand	Based on Mean	.187	1	42	.668
	Based on Median	.177	1	42	.676
	Based on Median and with adjusted df	.177	1	41.988	.676
	Based on trimmed mean	.188	1	42	.667

Based on the results of the SPSS output, the significance based on the mean was 0.668 (0.668) > 0.05, and the passing variance for the experimental group and the passing variance for the control group were the same or homogeneous. Based on the above result, the significance value (Sig) based on the median was 0.676 > 0.05; thus, the variance of the post-test data for the experimental class and the post-test data for the conventional class was the same / homogeneous. Next, the test requirements for the independent sample t-test were fulfilled.

A hypothesis test (t-test) was carried out to determine if there was a difference in the means of the two unpaired samples. The requirements for this test were that the data was normally distributed and homogeneous. This test was carried out to answer the question: "is there a difference between the new model and the conventional / old model?". This test was carried out on the post-test data from the experimental class with the post-test data from the control / conventional class.

Table 7. Group statistics
Group Statistics

Kelas		N	Mean	Std. Deviation	Std. Error Mean
Forehand	Eksperimen	22	24.95	1.133	.242
	Kontrol	22	22.95	1.214	.259

The statistical groups each included 22 subjects. The post-test results of the experimental group were higher than those of the control group with an average of 24.95 to 22.95. Thus, the experimental group subjects were better than the control group. Thus, the use of the mini tennis based-game is effective for improving groundstroke forehand drive in those who are 6–8 years of age.

Table 8. Independent samples test
Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			95% Confidence Interval of the Difference			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Forehand	Equal variances assumed	.187	.668	5.649	42	.000	2.000	.354	1.286	2.714
	Equal variances not assumed			5.649	41.801	.000	2.000	.354	1.285	2.715

According to the independent samples test, the 2-way (t-tailed) significance value was 0.00 < 0.05; thus, there was a significant difference in point scores between the experimental group and the control group. Based on the above conclusions, there was a difference in the effectiveness of the application of the mini tennis based games and the conventional training model for improving the forehand drive tennis skills of Sumatera Barat athletes who are 6–8 years of age.

Discussion

The game of tennis is a sport that is very popular and favoured by all levels of society; it is also a fun and exciting game. There is no age limit, and both men and women of all ages can play and enjoy the game of tennis (Akhiruyanto, 2010). It can be played as single, double, or mixed, and it requires a ball, racket as a hitter and a rectangular field with a net that divides the field equally. The purpose of playing tennis is to maintain a healthy body, fulfil the desire to move, and achieving victory by obtaining points with hits that cannot be reached by the opponent or placing the ball in a direction that is difficult for the opponent to return (Prabowo, 2017). After experiencing propagation, development, comprehensive improvement and innovation periods, it has

now become a worldwide sport that is aimed at being “higher, faster, more complete, more accurate and speed-changing (Zhang et al., 2018).

There are several research results related to game-based mini tennis models. The results showed that the level of effectiveness was significant, but this study was still limited to a few clubs. Therefore, it is very important for all training sessions, especially for tennis athletes who are 6–8 years of age, that the training model emphasizes fun but contains learning. The learning approach through a coach’s play activities can help us identify skilled players and less skilled players (Romeas et al., 2016). Additionally, coaches can improve their individual and tactical abilities through play (Gibson Moreira Praça, Filipe Manuel Clemente, André Gustavo Pereira de Andrade, Juan Carlos Perez Morales, 2017).

The principle of learning from games was supported by Johns (2006) who quoted that “The games approach lets kids discover what to do in the game not by telling them but by their experiencing it”. Meanwhile, according to Brueggemann (2008), The game is the best teacher.” Based on this philosophy, the essential demands of soccer are addressed. The first and most crucial demand requires players to practice what is needed and how it is needed. Mini tennis model training is a model approach in the learning tennis court to facilitate learning outcomes (Made Danu Budhiarta, n.d.). Tennis played on a short court, a low net, a slow ball and a small racket”; thus, it can be practiced in many places. The mini-tennis class has to be fun, easy, and have many visual demonstrations. (Salduba San Pedro de Alcántara & Profesor de Educación Física, 2010) One relevant study is The ability level for forehand groundstrokes and backhand groundstrokes for the students of Menoreh Tennis Club, Handayani Tennis Club, and Bantul Tennis Camp in 2015 (Ngatman & Sulistyatna, 2015)

Conclusions

Based on the results of our study on the effect of this game-based mini tennis training model on forehand drive skills, the use of game-based tennis models could improve forehand drive skills of tennis athletes who are 6–8 years old in West Sumatra. Thus, the results of the descriptive statistics with 22 experimental subjects showed a mean of 18.05, and after they were given the treatment, the post-test results showed a mean of 24.95. This shows that descriptively differences were obtained before and after treatment. Thus, the result of the descriptive statistics for the 22 control subjects was a mean of 18.09, and after treatment, the average post-test result was 22.95. This shows that descriptively differences were obtained before and after treatment. Therefore, the game-based mini tennis model can be implemented and is effective for improving skills in forehand drive tennis for West Sumatran athletes who are 6–8 years of age. Our results showed that the level of effectiveness was significant, but this study was still limited to a few clubs. Further development is useful for the rejuvenation of science. The resulting model should be added again so that there can be a lot of variation so that the exercise can be carried out optimally. Research subjects should use a wider range. The resulting mini tennis training model should be disseminated to a wider level so that it will be easier for trainers to get references to variations of the tennis mini training model. This is the suggestion that the researcher conveys for the use and further development of the game-based mini tennis exercise model for forehand strokes in children aged 6-8 years.

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